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In re Application of: **Michael Bolster**

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For: ** **Float Valve for a Christmas Tree Watering System**

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Sir:

In regard to the above-noted Application, and in order to comply with the Duty of Disclosure requirements of 37 C.F.R. 1.56, I submit herewith an Information Disclosure Statement by Applicant form.

Respectfully submitted,



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**TITLE: FLOAT VALVE FOR A CHRISTMAS TREE
 WATERING SYSTEM**

FIELD OF THE INVENTION

This invention pertains to Christmas tree watering devices and more particularly, it pertains to a float valve connected to a hose and a funnel to fill the reservoir of a Christmas tree stand with water from an elevated position.

5 BACKGROUND OF THE INVENTION

Generally, a natural Christmas tree has lower branches that extend more than an arm's length around its stand. The tree stand is often covered with decorating paper and snow-imitating wool or is hidden by a manger. Wrapped gifts are stowed around the tree stand for several days and even
10 weeks preceding Christmas eve. Therefore, the reservoir of a tree stand is hardly accessible to add water therein.

For all these reasons, a hose and a funnel are normally used to add water into the reservoir of a tree stand to keep the tree fresh and green during the entire holiday season. In most Christmas tree watering systems, a valve is
15 mounted inside the reservoir of the tree stand to stop the flow of water from the hose and funnel when the water has reached a predetermined level inside the reservoir. The backflow of water inside the funnel indicates a full-reservoir condition.

Numerous Christmas tree watering systems have been developed in the past
20 and have enjoyed varying degrees of success. Some watering systems of

the prior art are known to occasionally fail to indicate a full-reservoir condition. This deficiency causes an overflow of water from the reservoir of the tree stand or from the funnel above the tree stand, to the floor. An overflow of water from the reservoir of the tree stand is a particular concern because that water often contains dissolved tree sap and other tree extracts which could stain a carpet permanently.

Christmas tree watering systems of a common type are described in the following documents;

US **5,076,009** issued on December 31, 1991 to Michael Cibor;

US **5,522,179** issued on June 4, 1996 to Peter R. Hollis;

US **5,575,110** issued on November 19, 1996 to Luc. M. Couture;

US **6,073,390** issued on June 13, 2000 to Stephen R. Baudier; and

US **6,260,303** issued on July 17, 2001 to George Lewis Sappenfield.

The type of Christmas tree watering systems described in these documents generally comprises a funnel on a Christmas ornament or at other elevated location along the tree. A hose is connected to the funnel and extends to a valve mounted inside the reservoir of the tree stand. The valve has a float therein moving with the water level inside the reservoir. The float carries a valve disc which coincides with the end of the hose, and blocks the end of the hose when the water in the reservoir rises to a predetermined level.

A second type of watering system is described in the US Patent **5,090,443** issued on February 25, 1992 to Paul S. Jacobsen. This document discloses a float valve in which the end of the water hose is laying against a float. The float moves upward in a casing with the level of water in the reservoir of the tree stand, to bend the hose and block the flow of water inside the hose.

A third type of watering system is described in the US Patent **5,937,574** issued on August 17, 1999 to David R. Jacques. This document discloses a float valve for a Christmas tree stand in which is mounted a float on the end of a lever. The lever is pivoted on a pin through its centre. A stud on the opposite end of the lever pushes a ball away from a valve seat thereby allowing a flow of water through the valve seat. As the float rises, the stud retracts and let the ball fall into the valve seat to block the flow of water through the valve seat.

In the prior art valves of the first and second types, the head pressure from the water inside the hose and the funnel forces the valve's flap or disc to open. In this arrangement, the inertia of a rush of water in the hose, such as in the case of an unsteady filling of the funnel, tends to open the valve, even when the float is partly submerged. Therefore, in order to properly close the valve, the float must first gain sufficient buoyancy to overcome this head pressure.

In the prior art valve of the third type, the inflow of water in the hose acts directly against the ball of the valve forcing it to close unexpectedly or prematurely, thereby generating an overflow of water over the rim of the funnel.

As such, it may be appreciated that there continues to be a need for a new and improved float valve which is not susceptible of slow closure because of a head pressure and is not susceptible of premature closure from a flow surge inside the inlet hose.

SUMMARY OF THE INVENTION

The float valve according to the present invention comprises a lift valve wherein the valve disc closes against a valve seat in a same direction as the flow of water through the valve seat, and wherein the valve stem and disc
5 are movable sideways from the flow of water to avoid the force of the flow of water through the valve seat. A movement of the float with the rising water pulls the valve disc back into the flow of water such that this flow assists the float in closing the valve. The float valve is thereby reliable for indicating a full-reservoir condition in a timely manner.

10 In accordance with one feature of the present invention, there is provided a float valve for use in a Christmas tree watering system. The float valve comprises a housing having an upper portion, a water inlet in the upper portion, and a perforated bottom surface. A lift valve inside the float valve has a circular valve seat between the water inlet and the perforated bottom
15 surface; a valve disc mounted between the water inlet and the valve seat and a valve stem extending from the valve disc through the valve seat.

The float valve according to the present invention also has a mechanism to raise and lower the valve disc in response to a water level inside the housing. In this arrangement, the valve seat has a first vertical axis and the
20 water inlet has a second vertical axis and the first and second vertical axes are parallel to each other and are spaced apart a distance corresponding substantially to a radius of the valve seat.

Because of this structure, the flow of water through the valve seat is offset from the valve seat and from the valve disc whereby it is less susceptible
25 of applying a force on the valve disc in a closing direction, when the valve seat is fully open.

In accordance with another feature of the present invention, the mechanism to raise and lower the valve disc comprises a float and a rocker arm pivotally connected to the housing, to the float and to the valve stem for a seesaw movement with the float and the valve stem. The rocker arm has a clevis on one end thereof. The valve stem is pivotally mounted in the clevis and the rocker arm has a stud thereon adjacent the clevis. The stud interferes with the valve stem for blocking a movement of the valve stem in the clevis and for leaning the valve stem away from the axis of the water inlet.

When the float is in a lower position, the valve disc is positioned away for the flow of water through the valve seat and does not restrict the flow of water through the valve seat. When the float rises to a prescribed level, however, the float pulls the valve stem and the valve disc back into the axis of the valve seat whereby the flow of water through the valve seat helps to close the valve.

Upon closure of the valve, the water level rises quickly into the hose and the funnel at a same rate as the water added into the funnel, to reliably indicate a full-reservoir condition.

Still another feature of the float valve of the present invention is that it is susceptible of a low cost of manufacture with regard to both materials and labour, and which accordingly is then susceptible of low prices of sale to the consumer, thereby making such float valve economically available to the public.

Other advantages and novel features of the present invention will become apparent from the following detailed description of the preferred embodiment.

BRIEF DESCRIPTION OF THE DRAWINGS

One embodiment of the present invention is illustrated in the accompanying drawings, in which like numerals denote like parts throughout the several views, and in which:

5 **FIG. 1** illustrates a Christmas tree and a preferred tree watering system comprising the float valve according to the preferred embodiment;

FIG. 2 is a perspective view of the float valve according to the preferred embodiment with the housing broken away to illustrate the internal structure thereof;

10 **FIG. 3** is a cross-section view of the preferred float valve in a closed mode, as seen along a vertical plane passing widthwise through the valve housing;

FIG. 4 is another cross-section view of the float valve, in an open mode;

15 **FIG. 5** is a perspective view of the clip holding the housing halves together.

DESCRIPTION OF THE PREFERRED EMBODIMENT

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will be described in details herein one specific embodiment, with the understanding that the present disclosure is
20 to be considered as an example of the principles of the invention and is not intended to limit the invention to the embodiment illustrated and described.

Referring to **FIG. 1**, one best mode of using the float valve of the present invention in a Christmas tree watering system is illustrated therein. In this illustration, the float valve **20** is mounted inside a tree stand reservoir **22** and is retained to the rim of the tree stand reservoir by a clip **24**. A hose **26**
5 extends from the float valve **20** to a funnel **28** mounted at a convenient height in the Christmas tree **30**. In the preferred embodiment, the hose **26** is coloured to blend in with the branches of the tree and the funnel **28** is decorated as a Christmas ornament. Water is added into the funnel **28** until the float valve shuts off and a backflow of water is observed in the funnel
10 **28**. The height of the float valve **20** is selected so that the reservoir **22** contains a proper level of water therein when the backflow is observed in the funnel **28**. The content of the funnel **28** and of the hose **26** may then seep down slowly into the tree stand reservoir **22** without overfilling the reservoir.

15 Referring now to **FIGS. 2-4** simultaneously, the structural arrangement and operation of the float valve **20** according to the preferred embodiment will be described in details.

The float valve **20** has a housing **32** made of an upper half **34** and a lower half **36** joined together at a horizontal seam **38**. The seam **38** preferably comprises a ridge and groove lock **40** such that the two halves **34**, **36** are separable from each other for periodically cleaning the interior of the valve housing **32**.
20

The upper portion of the upper half **34** comprises a valve compartment **42** which is covered by a cap **44**. A hose nipple **46** extends upward from the cap **44**. The lower half **36** of the valve housing **32** has a perforated bottom surface **48** which is illustrated in **FIG. 2**. In use, water is introduced in the
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valve housing **32** through the hose nipple **46** and flows out of the housing through the perforations in the bottom surface **48**.

5 The upper half **34** of the valve housing **32** has a pair of holed tabs **50**, holding a rocker arm **52** by its middle segment. The upper half **34** of the valve housing **32** also has a float guiding cavity **54** in which is mounted a cylindrical float **56**. The float **56** is free to move up and down according to the level of water in the housing **32**. The upper half **34** of the valve housing **32** has a vent hole **58** in the upper wall thereof to evacuate trapped air from the float guiding cavity **54** during the movement of the float **56**.

10 The rocker arm **52** has a rounded end **60**, a transverse shaft **62** through its middle segment and a clevis **64** on the other end thereof. That other end is also referred to as the clevis end. The transverse shaft **62** is mounted in the holed tabs **50** for a seesaw movement of the rocker arm about the holed tabs **50**.

15 The float **56** has a socket **66** in its side in which is engaged the rounded end **60** of the rocker arm **52**, for causing the rocker arm **52** to move with the float **56**.

The float valve **20** also comprises a valve stem **68** with a lower thick end **70** and a valve disc **72** mounted on the upper end of the stem **68**.

20 The thick lower end **70** is pivoted in the clevis **64** of the rocker arm **52**. The valve stem **68** has an appropriate length such that the valve disc **72** moves up and down inside the valve compartment **42** in response to a movement of the float **56** and the rocker arm **52**.

A valve seat 74 in the bottom surface of the valve compartment 42 creates a partition between the valve compartment 42 and the upper half 34 of the housing.

5 The valve stem 68, the valve disc 72 and the valve seat 74 constitutes a poppet-type valve also referred to as a lift valve.

The valve stem 68 is further dimensioned to engage the valve disc 72 into the valve seat 74 and seal the valve seat 74 when the float 56 is in its upper position as illustrated in FIG. 3. It will be appreciated that an upward movement of the float 56 causes the rocker arm to tilt and to pull the valve
10 stem 68 downward to close the valve seat 74 and to stop the flow of water between the valve compartment 42 and the upper and lower halves 34, 36 of the housing 32.

A seep hole 76 which is illustrated in FIG. 2 may be provided through the valve disc 72 to slowly drain the content of the hose 26 and of the funnel
15 28 following an addition of water to the reservoir 22 of a tree stand. Although a seep hole 76 is illustrated, it will be appreciated that the same result may be obtained with an imperfect seal between the valve disc 72 and the valve seat 74.

Referring particularly to FIG. 4, the axis 78 of the hose nipple 46 is offset
20 from the axis 80 of the valve seat 74 by a distance 'A' corresponding substantially to the radius of the valve seat 74. The advantage of this offset is that only a limited portion of the water flowing into the valve compartment washes against the valve disc 72 and the corresponding downward force on the valve disc 72 is relatively small.

In order to further reduce the amount of water washing against the valve disc 72, a short stub 82 is provided on the rocker arm 52 adjacent the clevis 64. This short stub 82 pushes against the thick end 70 of the valve stem 68 when the rocker arm is tilted in the valve-open position as illustrated in FIG. 4, and causes the valve stem 68 and the valve disc 72 to lean away from the axis 78 of the hose nipple 46. When the valve disc 72 is in this position, very little water washes against the valve disc 72 and only a negligible downward force is applied against the valve disc 72.

Referring back to FIG. 3, the short stub 82 moves away from the thick end 70 of the valve stem 68 when the rocker arm 52 moves to a valve-closed position as illustrated in that drawing. Therefore the valve disc 72 is then free to align with the valve seat 72 to close the valve seat. When the rocker arm moves toward the position illustrated in FIG. 3, the valve disc 72 is brought back in alignment with the valve seat 74 and into the flow of water through the valve seat, whereby this flow enhances the closing of the valve seat 74 by the valve disc 72.

For reference purposes, the size and material of the float 54 is selected such that its buoyancy causes the valve disc 72 to close the valve seat 74 when the water level inside the housing 32 is slightly above the seam 38.

The clip 24 of the preferred valve 20 is illustrated in its entirety in FIG. 5. The clip 24 has an upper and lower identical grooves, labelled 84, 86 respectively. The grooves 84, 86 face each other and are separated by a riser 88 having a length substantially the same as the height of the upper and lower halves of the housing 32. In use, the clip 24 mounts to the housing 32 to enclose the housing 32 and to keep both halves 34, 36 together. The upper groove 84 engages over a ridge 90 on the top of the

upper half 34, as best seen in FIG. 2. The lower groove 86 engages over
a second ridge 92 which is only partly illustrated in FIGS. 3 and 4,
extending over the exterior bottom surface of the lower half 36. It will be
appreciated from the illustrations that although the second ridge 92 is only
5 partly illustrated, it has substantially a same cross-section as the first ridge
90 for engagement into a similar groove as for the first ridge.

In addition to keeping both halves together, the clip 24 is well fastened to
the housing 32 by the engagement of the grooves 84, 86 and ridges 90, 92,
and is used to support the housing to the rim of a reservoir as previously
10 illustrated. For this purpose the clip 24 has a curved lip 94 on its upper end
opposite the upper groove 84 relative to the riser 88. The curved lip 94
defines a hook 96 on the riser 88 for attachment to the rim of a tree stand
reservoir.

All the components of the preferred float valve are made of plastic by
15 injection molding for example.

As to other manner of usage and operation of the present invention, the
same should be apparent from the the above description and accompanying
drawings, and accordingly further discussion relative to the manner of
usage and operation of the invention would be considered repetitious and
20 is not provided.

While one embodiment of the present invention has been illustrated and
described herein above, it will be appreciated by those skilled in the art that
various modifications, alternate constructions and equivalents may be
employed without departing from the true spirit and scope of the invention.
25 Therefore, the above description and the illustrations should not be

construed as limiting the scope of the invention which is defined by the appended claims.